

5-YEAR REVIEW

Berberis nevinii (Nevin's barberry)

GENERAL INFORMATION

Species: *Berberis nevinii* (Nevin's barberry), a plant species

Date listed under the Endangered Species Act: October 13, 1998

Federal Register citation: USFWS 1998 (63 FR 54956–54971)

Classification: Endangered

BACKGROUND

Under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 *et seq.*), the U.S. Fish and Wildlife Service (USFWS), referred to as “we” in this document, maintains lists of endangered and threatened wildlife and plant species (referred to as the List) in the Code of Federal Regulations (CFR) at 50 CFR 17.11 (for wildlife) and 17.12 (for plants). Section 4(c)(2)(A) of the Act requires us to review each listed species' status at least once every 5 years.

Most recent status review: USFWS. 2009. *Berberis nevinii* (Nevin's barberry); 5-year Review: Summary and Evaluation. Carlsbad Fish and Wildlife Office, Department of the Interior. 31 pp.

We initiated the status review for *Berberis nevinii* in 2009. The review was finalized on August 14, 2009, and recommended no change in status.

Federal Register Notice citation announcing this status review: On January 27, 2020, we published a *Federal Register* notice announcing initiation of the 5-year review of this species, and the opening of a 60-day comment period to receive information (USFWS 2020, pp. 4692–4694). We received no information about *Berberis nevinii*.

ASSESSMENT

Information Acquired Since the Last Status Review

This 5-year review was conducted by the USFWS's Carlsbad Fish and Wildlife Office. Data for this review were solicited from the public and interested parties through a *Federal Register* notice announcing this review on January 27, 2020 (USFWS 2020, pp. 4692–4693). We also contacted Federal partners and species experts to request any data or information we should consider in our review. Additionally, we conducted a literature search and a review of information in our files. We prepared a Species Biological Report (USFWS 2021, entire) that assesses the new information about *Berberis nevinii*.

SUMMARY OF NEW INFORMATION SINCE 2009

Biology and distribution

Monitoring and surveys

This section summarizes *Berberis nevinii* population monitoring and surveys that have occurred since 2009.

Between 2014 and 2017, California Botanic Garden staff (formerly Rancho Santa Ana Botanic Garden) counted all *Berberis nevinii* plants at the San Francisquito Canyon (SFC) population, and assessed plant recovery after the 2002 Copper Fire (Washburn and Fraga 2017, pp. 6–7). They found 162 *B. nevinii* individuals at SFC (Washburn and Fraga 2017, p. 9). From the census and plant measurement information, they concluded that: 1) the SFC population of *B. nevinii* is expanding, 2) the population has different age classes of plants, and 3) the population has periodic seedling establishment (Washburn and Fraga 2017, pp. 9–12).

In addition to the detailed study at SFC, Washburn and Fraga (2017, p. 28) sampled *Berberis nevinii* for a genetic study. The study sampled occurrences from across the species' range, and provided information about occurrence status.

We also have new information from project-related surveys for *Berberis nevinii*. In 2019, Caltrans completed environmental review for shoulder widening and bridge rehabilitation projects along State Route 79 in the Vail Lake area. Project surveys found two *B. nevinii* plants within the road right-of-way [California Natural Diversity Database (CNDDDB) Element Occurrences (Eos) 20 and 31] (Caltrans 2019a, p. 17), and one individual within the bridge study area (CNDDDB EO 20) (Caltrans 2019b, p. 47). Additionally, in 2017, one *B. nevinii* individual was reported during environmental assessment of the Mesa Substation Project (Whittier Narrows occurrence, Table 1) (USFWS 2017, pp. 1–2, 36).

Finally, the Western Riverside County Multiple Species Habitat Conservation Plan (WRC-MSHCP) Biological Monitoring Program surveys rare plant occurrences within the MSHCP Conservation Area, in order to provide data about occurrence status and abundance (BMP 2017, pp. iii, 2). Between 2006 and 2014, the Biological Monitoring Program surveyed three occurrences of *Berberis nevinii*—CNDDDB EOs 20, 31, and 38—in the Agua Tibia Mountains (BMP 2015, p. 8).

Genetics

Washburn and Fraga (2017, p. 28) sampled 13 locations of *Berberis nevinii* for a genetic study. They found that:

1. There is more genetic variation within *B. nevinii* populations than between populations (p. 31).
2. Populations at SFC and Claremont have higher genetic diversity, relative to other locations (p. 31).

3. The Vail Lake population is the most differentiated from other *B. nevinii* populations (p. 40).
4. Alleles from Pacoima Wash are present in plants on the Cleveland National Forest, meaning that those occurrences may have been planted (p. 39).

Breeding system and pollination

Washburn and Fraga (2017, pp. 22–25) studied the breeding system of *Berberis nevinii*. They found that 1) open pollinated flowers had significantly lower rates of fruit abortion and higher rates of seed set (14.6 percent fruit abortion; 84.8 percent seed set), and that 2) bagged flowers had higher rates of fruit abortion, and lower rates of seed set (46.0 percent fruit abortion; 58.0 percent seed set) (Washburn and Fraga 2017, p. 24). They concluded that *B. nevinii* is mostly outcrossing, but can self-fertilize (Washburn and Fraga 2017, pp. 26–27).

Washburn and Fraga (2017, p. 24) observed both nonnative honeybees (*Apis mellifera*) and native bees visiting *Berberis nevinii* flowers, but nonnative honeybees were the principal visitors.

Distribution

Since the 2009 5-year review, we received new information about the status of some occurrences. We also have information about three occurrences that were not considered in the 2009 5-year review.

Based on new information, the following occurrences are now considered extirpated or possibly extirpated:

1. CNDDDB EO 5 (near the mouth of Scott Canyon) was considered extant in 2009, but is possibly extirpated after a recent fire (USFWS 2021, pp. 14, 16).
2. An occurrence in the Jurupa Hills—not considered in the 2009 5-year review—has since been reported as extirpated by development (BMP 2015, p. 23).
3. CNDDDB EO 13 (near the intersection of Washington and Arroyo Boulevards, Pasadena, California) is possibly extirpated. No plants were found in the area during 2010 and 2013 focused surveys for the species, which were conducted in association with the Pasadena Non-Potable Water Project (Medak 2021, pers. comm.).

Three new locations have been reported or become known to us since 2009:

1. In 2005 and 2017, four *B. nevinii* locations were reported from La Purisima Mission State Historic Park, northeast of Lompoc in Santa Barbara County (Calflora 2020, unpaginated). This location expanded the range of *B. nevinii* approximately 118 miles west from the next-nearest natural origin occurrence, in Pacoima (CNDDDB EO 6). It is unclear whether the Lompoc locations are planted or of natural origin.

2. In 2016, Burgess and Elvin collected *B. nevinii* at California State University Channel Islands, in Ventura County. Plants were in partial shade in a sycamore grove, and were noted as naturalized (Calflora 2021, unpaginated).
3. One *Berberis nevinii* individual was reported during an environmental assessment of the Mesa Substation Project (USFWS 2017, pp. 1, 2, 36). The plant is adjacent to a paved trail within the Whittier Narrow Recreation Area (USFWS 2017, p. 36). Our biological opinion on the permit issuance for this project determined that the project was not likely to adversely affect *B. nevinii*, because no direct impacts were anticipated (USFWS 2017, pp. 2, 36). The biological opinion established conservation measures to avoid and minimize potential impacts (USFWS 2017, pp. 37–38).

Based on the new information, there are 40 occurrences of *Berberis nevinii*: 27 are extant or presumed extant, 8 are possibly extirpated, and 5 are extirpated. Additionally, 1 occurrence is erroneous (USFWS 2021, p. 15).

Threats

Our 2009 5-year review discussed threats to *Berberis nevinii* from: 1) urbanization, 2) recreational activities, 3) road widening, 4) fire management practices, 5) altered fire regimes, 6) small population size, 7) low reproductive output, and 8) climate change. This section summarizes new information about threats to *Berberis nevinii* since 2009.

Urbanization (Residential development)

In the 2009 5-year review for *Berberis nevinii*, development was considered an immediate threat to the species, due to a proposal to develop the Vail Lake area (USFWS 2009, p. 13).

In 2014, the Rancho California Water District (RCWD) acquired the lands encompassing the Vail Lake occurrences of *Berberis nevinii*, eliminating the immediate threat of residential development. The area is not under permanent conservation (for example, through conservation easement). However, RCWD management objectives for the area include habitat conservation and restoration (RCWD 2016, p. 6).

We do not have information about other ownership or conservation status changes at other *Berberis nevinii* occurrences since 2009.

Recreational activities

In the 2009 5-year review, we discussed recreational threats to *Berberis nevinii* at four locations (San Timoteo Canyon, Dripping Springs Campground, Vail Lake, and Cobal Canyon). Off-road vehicles, horseback riding, hiking, camping, and recreational facility development were all listed as threats to *B. nevinii* (USFWS 2009, p. 14).

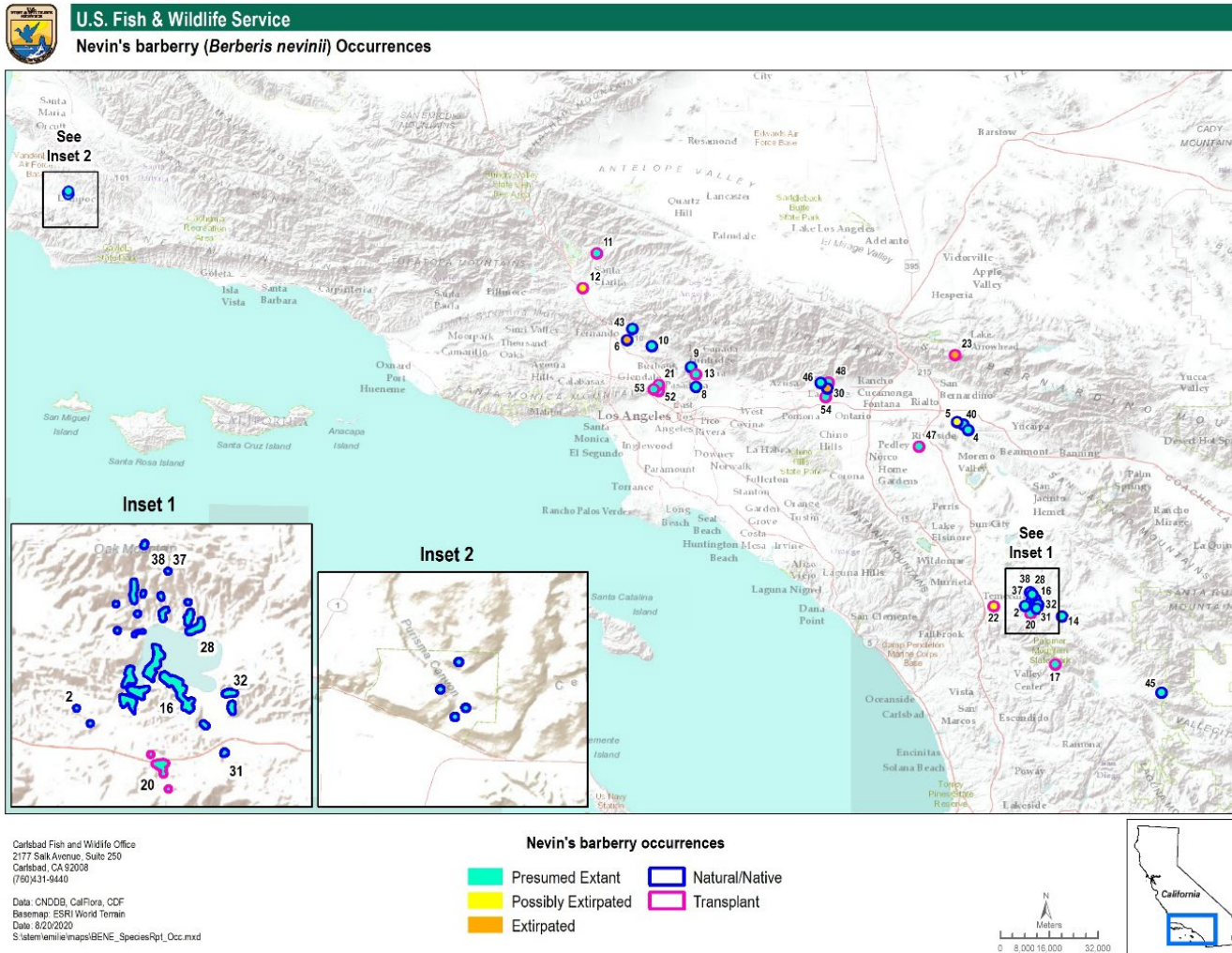


Figure 1. Distribution of *Berberis nevinii* (Nevin's barberry), showing the CNDDDB EO number, occurrence status, and whether the occurrence is presumed site-native or planted. The Lompoc occurrences at La Purisima Mission State Historic Park (inset 2) have not been assigned a CNDDDB EO number.

Table 1. Occurrence table for *Berberis nevinii* (Nevin's barberry).

CNDDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
NA	La Purisima Mission State Historic Park	Santa Barbara	Yes	Presumed Extant	State	NA	NA	NA	2005	Recreational activities, fire management practices, altered fire regimes
NA	Rock canal South of road bridge, La Purisima Mission State Historic Park	Santa Barbara	Yes	Presumed Extant	State	NA	NA	NA	2017	Recreational activities, fire management practices, altered fire regimes
NA	La Artemisia Trail, La Purisima Mission State Historic Park	Santa Barbara	Yes	Presumed Extant	State	NA	NA	NA	2017	Recreational activities, fire management practices, altered fire regimes
NA	Upper Loop, Cuclillo de Tierra Rd., La Purisima Mission State Historic Park	Santa Barbara	Yes	Presumed Extant	State	NA	NA	NA	2017	Recreational activities, fire management practices, altered fire regimes

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CNDDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
11	San Francisquito Canyon – near Powerhouse #3	Los Angeles	No	Presumed Extant	Angeles National Forest	131	1986	14	2018	NA
12	San Francisquito Canyon/Santa Clara River	Los Angeles	No	Possibly Extirpated	Unknown	NA	NA	NA	NA	NA
43	Lopez Canyon	Los Angeles	Yes	Presumed Extant	Angeles National Forest	1	1997	1	2000	Fire management practices, altered fire regimes
6	Van Nuys Blvd, San Fernando Valley	Los Angeles	Yes	Extirpated	Private	100	1932	0	1999	NA
10	Sunland	Los Angeles	No	Presumed Extant	State	NA	1904	1	2006	NA
9	Devil's Gate, Arroyo Seco	Los Angeles	Yes	Possibly Extirpated	Unknown	NA	1927	NA	NA	NA
13	North of Rose Bowl	Los Angeles	No	Possibly extirpated	Local	5	1987	NA	1999	NA
8	South Pasadena, Arroyo Seco	Los Angeles	Yes	Possibly Extirpated	Unknown	NA	1961	NA	NA	NA

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CNDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
21	Griffith Park	Los Angeles	No	Presumed Extant	Local	40	1986	25	2000	NA
52	Vicinity of Vermont Canyon and Griffith Observatory, Griffith Park	Los Angeles	No	Presumed Extant	Local	NA	NA	NA	2010	NA
53	Griffith Park near Observatory	Los Angeles	No	Presumed Extant	Local	NA	NA	NA	2019	NA
30	San Antonio Wash	Los Angeles	Yes	Extirpated	Unknown	<5	1980s	0	2005	NA
46	Cobal Canyon	Los Angeles	Yes	Presumed Extant	Local	NA	NA	1	2005	Recreational activities, fire management practices, altered fire regimes
48	Mt. Baldy Road/Padua Ave	Los Angeles	No	Presumed Extant	Local	1	1997	NA	NA	NA

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CNDDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
54	Pitzer College; NW Section of Outback, Along western boundary with Harvey Mudd Soccer Field, Claremont	Los Angeles	No	Presumed Extant	Private	NA	NA	NA	1999	NA
NA	Griffith Park near Observatory	Los Angeles	No	Presumed Extant	Local	NA	NA	NA	NA	NA
49	Wildwood Canyon	Los Angeles	No	Presumed Extant	Local	NA	NA	1	2007	NA
NA	Whittier Narrows	Los Angeles	Unknown	Extant	Local	NA	NA	1	2017	NA
23	North of highway 18	San Bernardino	No	Extirpated	Private	NA	1966	NA	NA	NA
47	City of Riverside, granitic knoll	Riverside	No	Presumed Extant	Unknown	1	1999	NA	NA	NA

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CNDDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
4	Side canyon of San Timoteo Canyon	San Bernardino/Riverside	Yes	Presumed Extant	Private	7	1987	3	2009	Recreational activities, fire management practices, altered fire regimes
5	Near the mouth of Scott Canyon	San Bernardino	Yes	Possibly Extirpated	Unknown	1	1990s	0	2014	NA
40	Pilgrim Road, south of Redlands	San Bernardino	Yes	Extirpated	Unknown	NA	1988	NA	NA	NA
38	Oak Mountain Summit	Riverside	Yes	Presumed Extant	BLM	2	1990	1	2012	Recreational activities, fire management practices, altered fire regimes
37	South-facing slope of Oak Mountain	Riverside	Yes	Presumed Extant	Private	1	1989	0	1999	Recreational activities, fire management practices, altered fire regimes

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CNDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
28	Northeast of Vail Lake	Riverside	Yes	Presumed Extant	Private	4	1989	NA	NA	Recreational activities, fire management practices, altered fire regimes
16	West of Vail Lake Dam	Riverside	Yes	Presumed Extant	Private	NA	1989	2	2006	Recreational activities, fire management practices, road widening, altered fire regimes
2	Dripping Springs	Riverside	Yes	Presumed Extant	Private	1	1989	NA	NA	Recreational activities, fire management practices, altered fire regimes
32	Temecula Creek East	Riverside	Yes	Presumed Extant	Private	3	1989	1	1989	Recreational activities, fire management practices, altered fire regimes

2021 5-year Review for *Berberis nevinii*

CNDDB Element Occurrence (EO)	Location Description	County	Site-native?	Status	Landowner	Highest Count Pre-listing	Pre-Listing Count Year	Last Count Post-listing	Last Count Year	Threats Code
20	Dripping Springs Campground Guard Station ⁴	Riverside	No	Presumed Extant	Cleveland National Forest/Private	5	1989	4	2014	Recreational activities, fire management practices, altered fire regimes
31	Agua Tibia Mountain Foothills	Riverside	Yes	Presumed Extant	Cleveland National Forest	5	1989	6	2014	Fire management practices, altered fire regimes
29	Northwest of Vail Lake	Riverside	No	Erroneous	Private	NA	1987	NA	NA	NA
22	South of Temecula Creek	Riverside	No	Possibly Extirpated	Private	2	1987	0	2008	NA
14	Aguanga	Riverside	Yes	Possibly Extirpated	Unknown	NA	1927	0	1999	NA
NA	Jurupa Hills	Riverside	Unknown	Extirpated	Unknown	NA	NA	NA	NA	NA
17	Southwest of Palomar Mountain	San Diego	No	Presumed Extant	Tribe	20	1987	12	2002	NA
45	Desert foothills of Anza-Borrego	San Diego	No	Presumed Extant	Unknown	NA	NA	NA	NA	NA

As discussed in the previous section, lands around Vail Lake were acquired by the RCWD in 2014. RCWD leases the Vail Lake campground to a campground operator, so ongoing recreational use occurs in the area southwest of Vail Lake. As in 2009, recreational use in the area could still threaten *Berberis nevinii* (CNDDDB EOs 2 and 16), but we do not have reports of impacts to individual plants.

We have no other new information about recreational threats to *B. nevinii*, so the information in the 2009 5-year review remains accurate.

Road widening

In the 1998 listing rule and the 2009 5-year review, we identified road widening as a threat to *Berberis nevinii*. We discussed planned road widening along State Route 79, near Vail Lake.

In 2019, Caltrans completed environmental review for a shoulder widening project along State Route 79 in the Vail Lake area. Project surveys found two *Berberis nevinii* plants within the road right-of-way (Caltrans 2019a, p. 17). One plant could be avoided during project construction (Caltrans 2019a, p. 17). The other plant could not be avoided, so Caltrans proposed to transplant the affected individual to a different area of suitable habitat, in consultation with resource agencies (Caltrans 2019a, p. 17). Caltrans also proposed to plant additional *B. nevinii* individuals and monitor plantings for 3 years (Caltrans 2019a, pp. 17, 25–26). Additionally, topsoil from the areas where *B. nevinii* is present would be conserved (Caltrans 2019a, p. iii).

Surveys for the Arroyo Seco Bridge rehabilitation project along the State Route 79 found one *Berberis nevinii* individual (Caltrans 2019b, p. 47). Since the plant was not in the project impact area, it was determined that it would not be affected by the project (Caltrans 2019b, p. 47).

We do not have information about past, ongoing, or planned road widening at any other *Berberis nevinii* occurrences.

Fire management practices

In 2009, we discussed the potential effects of fire management practices (fuel treatments, prescribed burns, and wildfire suppression) on *Berberis nevinii* individuals. We discussed the 2004 Eagle Fire, which burned in the Vail Lake/Oak Mountain area. We do not have any new information about the effects of fire management on *B. nevinii*, or reports of impacts from fire management. Refer to the next section for more information about the general effects of fire on *B. nevinii*.

Altered fire regimes

In 2009, we discussed the potential effects of altered fire regimes—specifically, more frequent fire—on *Berberis nevinii*. Citing White (2007, *in litt.*, p. 1), we stated that overly-frequent fire could kill young plants before they reach reproductive potential, and could deplete stored resources of mature *B. nevinii* (USFWS 2009, p. 21).

Since 2009, post-fire counts of *Berberis nevinii* at SFC have provided new information about how the species may respond to fire. Based on a comparison of pre- and post-fire census results, Washburn and Fraga (2017, pp. 9–10, 14) concluded that periodic, moderate intensity fires may not kill larger plants, but that smaller plants and seedlings are vulnerable to fire. These results confirm the observations by White (2007, *in litt.*, p. 1) that we discussed in 2009.

Since 2009, three fires have intersected *Berberis nevinii* occurrences: the 2012 Wilson Fire, the 2017 La Tuna Fire, and the 2017 Creek Fire (USFWS 2021, p. 27). We do not have specific information about how these fires affected *B. nevinii* plants or habitat, but we continue to consider too-frequent fire a threat to *B. nevinii*.

Small population size

The listing rule identified small population size as a threat to *Berberis nevinii*, noting that most *B. nevinii* individuals are concentrated in the Vail Lake area (USFWS 1998, pp. 54964–54965). In the 2009 5-year review, we considered small population size a significant threat to the species, because 57 percent of site-native occurrences had three or fewer individuals (USFWS 2009, p. 22).

We have new information about population size from the 2014 to 2017 *Berberis nevinii* census at SFC (which found 162 individuals). Outside of SFC, Washburn, and Fraga (2017, p. 3) estimated that there may be fewer than 200 *B. nevinii* individuals left in the wild. Therefore, small population size continues to threaten *B. nevinii*.

Low reproductive output

Low reproductive output was identified as a threat to *Berberis nevinii* in the listing rule (USFWS 1998, pp. 54964–54965), but observations of reproduction were not discussed. In the 2009 review, we discussed observations of seedlings in the Vail Lake area (including on the Oak Mountain summit, and southeast at Vail Lake), at San Timoteo Canyon, at SFC, and southwest of Palomar Mountain (USFWS 2009, pp. 22–23). Low seed set and lack of viable seeds was reported at several occurrences (USFWS 2009, p. 22).

The 2017 study by Washburn and Fraga provided new information about *Berberis nevinii* reproductive output. They found that *Berberis nevinii* was mostly outcrossing and had low rates of seed set when self-fertilized (pp. 26–27). That may limit seed set at small, isolated occurrences, where only one or a few plants are present (Washburn and Fraga 2017, pp. 26–27). On the other hand, plants can set relatively large numbers of fruit, and have high seed set per fruit (Washburn and Fraga 2017, pp. 26, 40). Although fruit and seed production may also be limited by rainfall and availability of non-self pollen, there are no other inherent limitations to reproduction (Washburn and Fraga 2017, pp. 26, 40).

Climate change

In 2009, we considered climate change as a threat to *Berberis nevinii*, but we did not have information to project how changing climate would affect the species. New information about

climate change has become available since 2009, and is summarized in the Species Biological Report (USFWS 2021, pp. 28–32). Climate change remains a threat to *B. nevinii*.

Summary of Threats

Since the 2009 5-year review, acquisition of the Vail Lake area has partially ameliorated the threat of residential development, improving the condition of *Berberis nevinii* in regards to this threat.

New information about five other threats (road widening, altered fire regimes, small population size, low reproductive output, and climate change) has become available since 2009. However, this new information does not alter the conclusions of our 2009 5-factor analysis, because those threats still affect *Berberis nevinii*. We received no new information about any other threats to the species.

Conservation Efforts

As part of the genetics and breeding system study, California Botanic Garden botanists developed a propagation protocol for *Berberis nevinii* and obtained two conservation collections of *B. nevinii* seed from SFC (Washburn and Fraga 2017, p. 16).

In addition to the two new seed collections from SFC, there are four other conservation collections of *Berberis nevinii* seed at California Botanic Garden (CBG 2020, unpaginated):

1. In 1990, *B. nevinii* was collected from SFC (accession number 16285).
2. In 2003, *B. nevinii* was collected from multiple plants within California Botanic Garden (accession number 21182).
3. In 1989 and 1990, *B. nevinii* was collected from CNDDDB EO 16 (Vail Lake) (accession numbers 16073 and 16284, respectively).

California Botanic Garden is working on a project to complete additional conservation activities for *Berberis nevinii* on the Angeles National Forest. The study includes 1) continued monitoring of *B. nevinii* at SFC, 2) a habitat suitability model to identify potential outplanting locations within the Copper Fire burn area, 3) a restoration out-planting, which will be documented over 5 years, and 4) additional *ex situ* seed conservation (Fraga 2019, unpaginated; Fraga 2020, pers. comm.).

CONCLUSION

Our 2009 status review and five-factor analysis of threats affecting *Berberis nevinii* (USFWS 2009) remains an accurate reflection of the species' current status.

In the 2009 5-year review, we recommended no status change for *Berberis nevinii*. Since 2009, we received new survey and monitoring information for *B. nevinii*, and some new information about threats to *B. nevinii*. However, this information does not alter the species' status or the

results of our 5-factor analysis in the 2009 5-year review. Therefore, we conclude that *B. nevinii* remains a federally endangered species.

RECOMMENDATIONS FOR FUTURE ACTIONS

1. Monitor known occurrences of *Berberis nevinii*, with a focus on occurrences not monitored by the California Botanic Garden or the Western Riverside County Multiple Species Habitat Conservation Plan. Survey surrounding areas of suitable habitat for additional plants.
2. Collect additional *B. nevinii* seeds for *ex situ* storage at a certified Center for Plant Conservation facility. Focus collection efforts on occurrences that are not yet represented in conservation seed collections.
3. Work with the Rancho California Water District to conserve and enhance the Vail Lake occurrences of *B. nevinii*. For example, census the Vail Lake population, collect seed, and assess threats associated with recreational use.
4. Model *B. nevinii* habitat under a range of future climate scenarios and evaluate current and future areas of suitable habitat to identify opportunities for assisted migration.
5. Reintroduce *B. nevinii* to areas of suitable habitat within the species' range.
6. Augment *B. nevinii* occurrences where occurrence size is small. Increase occurrence size by planting additional *B. nevinii*. Work with conservation botanists to determine genetic management strategies for small occurrences.
7. Restore and enhance *B. nevinii* habitat where needed (for example, by controlling nonnative plants).

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FIELD OFFICE APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

Approve

Scott A. Sobiech
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